WHAT IS CLAIMED IS:

1. A hydrokinetic torque converter, comprising:

a housing rotatable about a predetermined axis;

a pump rotatable by said housing about said axis;

a turbine rotatable in said housing about said axis by and relative to said pump;

means for rotating said housing;

an output element rotatable about said axis and arranged to receive torque from said turbine;

a fluid-operated bypass clutch arranged to transmit variable torque between said housing and said output element independently of said turbine, said clutch including a first part rotatable with said housing, a second part rotatable with said output element, and friction generating means operable to transmit torque between said parts with and without slip with attendant generation of friction heat during operation with slip;

first and second plenum chambers containing bodies of hydraulic fluid at variable pressure with the provision for fluid flow between said chambers past said friction generating means; and

means for regulating the fluid flow in dependency upon the magnitude of torque being transmitted by the clutch.

2. The torque converter of claim 1, further comprising torsional vibration damping means operating between said first part and at least one of said second part, said turbine and said output element.

3. The torque converter of claim 1, further comprising a stator provided in said housing intermediate said pump and said turbine.

4. A hydrokinetic torque converter, comprising:

a housing rotatable about a predetermined axis;

a pump rotatable by said housing about said axis;

a turbine rotatable in said housing about said axis by and relative to said pump;

means for rotating said housing;

an output element rotatable about said axis and arranged to receive torque from said turbine;

a fluid-operated bypass clutch arranged to transmit variable torque between said housing and said output element, said pump including a driving component rotatable with said housing and a driven component including a piston rotatable with said output element and movable in said housing axially into and from frictional engagement - with and without slip - with said driving component;

means for moving said piston, including first and second plenum chambers in said housing;

means for supplying to said chambers hydraulic fluid at variable pressure with the provision for fluid flow between said chambers through said clutch; and

adjustable means for regulating the fluid flow between said chambers in dependency upon the magnitude of torque being transmitted by said clutch, said regulating means being adjacent said components.

5. A hydrokinetic torque converter, comprising:

a housing rotatable about a predetermined axis;

a pump rotatable by said housing about said axis;

a turbine rotatable in said housing about said axis by and relative to said pump;

means for rotating said housing;

an output element rotatable about said axis and arranged to receive torque from said turbine;

a fluid-operated bypass clutch disposed in said housing and arranged to transmit variable torque between said housing and said output element, said clutch including a driving component rotatable with said housing and a driven component rotatable with said output element and movable axially of said housing into and from frictional engagement - with and without slip - with said driving component;

means for moving said driven component, including first and second plenum chambers containing bodies of hydraulic fluid at variable pressure with the provision for fluid flow between said chambers through said clutch; and

means for regulating the fluid flow between said chambers in dependency upon the magnitude of torque being transmitted by the clutch.

6. The torque converter of claim 5, wherein said regulating means includes means for automatically altering the rate of fluid flow between said plenum chambers in response to variations of the slip between said components.

7. The torque converter of claim 5, wherein said regulating means includes at least one channel provided in at least one of said components and arranged to establish a path for the flow of fluid between said chambers when said clutch is operated with slip.

8. The torque converter of claim 5, wherein said regulating means is operative to increase the rate of fluid flow between said chambers in response to increasing slip between said components.

9. The torque converter of claim 5, wherein said regulating means includes means for regulating the rate of fluid flow between said plenum chambers in dependency upon changes of RPM between said means for rotating said housing and said output element.

10. The torque converter of claim 5, further comprising means for varying the pressure of fluid in at least one of said plenum chambers independently of said regulating means.

11. The torque converter of claim 10, wherein said varying means is operative to vary the pressure of fluid in said at least one chamber as a function of changes of the RPM of said rotating means.

12. The torque converter of claim 5, wherein the viscosity of fluid in the fluid flow between said plenum chambers varies in response to the changes of the extent of slip between said components and the rate of fluid flow between said chambers is regulated in response to variations of said viscosity.

13. The torque converter of claim 5, wherein the temperature of fluid in the flow between said chambers varies in response to changes of the extent of slip between said components and the rate of flow between said chambers is regulated in response variations of said temperature.

14. The torque converter of claim 5, wherein said regulating means includes at least one channel provided in at least one of said components and arranged to establish a path for the flow of fluid between said chambers when said clutch is operated with slip, and an adjustable barrier against the flow of fluid in said at least one channel.

15. The torque converter of claim 5, wherein said driven component comprises a piston and at least one of said components comprises at least one friction lining contacting the other of said components in the engaged condition of said clutch.

16. The torque converter of claim 15, wherein said driving component forms part of said housing.

17. The torque converter of claim 15, wherein said driving component is affixed to said housing.

18. The torque converter of claim 15, wherein said piston is non-rotatably and axially movably mounted on one of said turbine and said output element.

19. The torque converter of claim 15, wherein said piston is arranged to at least partially seal said plenum chambers from each other at least while said driven component frictionally engages said driving component.

20. The torque converter of claim 5, wherein each of said components comprises a friction lining, said friction linings contacting each other in the engaged condition of said clutch.

21. The torque converter of claim 5, wherein said driving component forms part of said housing and said driven component comprises a piston at least partially sealing said plenum chambers from each other in the engaged condition of said clutch.

22. The torque converter of claim 5, wherein said clutch further comprises a lamella disposed between said components and movable axially of said housing, in response to axial movement of said driven component, into frictional engagement with said components in the engaged condition of said clutch.

23. The torque converter of claim 22, wherein said driven component comprises a piston rotatable with said housing, said clutch further comprising at least one friction lining provided on said lamella and frictionally engaging one of said components in the engaged condition of said clutch.

24. The torque converter of claim 22, wherein said clutch further comprises a first friction lining carried by one of said lamella and said driving component and engaging the other of said lamella and said driving component in the engaged condition of said clutch, and a second friction lining carried by one of said lamella and said driven component and engaging the other of said lamella and said driven component in the engaged condition of said clutch.

25. The torque converter of claim 22, wherein said clutch further comprises at least one friction lining provided on one of said components and frictionally engaging said lamella in the engaged condition of said clutch.

26. The torque converter of claim 5, further comprising at least one cooling unit for said clutch, said cooling unit being arranged to exchange heat with at least one of said components.

27. The torque converter of claim 5, wherein said clutch further comprises at least one friction lining borne by one of said components and frictionally engaging the other of said components in the engaged condition of said clutch, said components and said friction linings having friction surfaces each of which engages another of said surfaces at least in the engaged condition of said clutch, said regulating means having recesses extending at least substantially radially of said axis and provided in at least one of said surfaces to establish at least a portion of said fluid flow in the engaged condition of said clutch.

28. The torque converter of claim 27, wherein said recesses are provided in surface of at least one of said components.

29. The torque converter of claim 27, wherein said recesses are embossed into said at least one surface.

30. The torque converter of claim 27, wherein said recesses are defined by displaced material of that one of said components and said at least one friction lining which is provided with said at least one surface.

31. The torque converter of claim 27, wherein said at least one friction lining is a washer having a predetermined width as measured radially of said axis, at least some of said recesses being provided in the surface of at least one of said components, being overlapped by said at least one friction lining, and having a length exceeding said predetermined width.

32. The torque converter of claim 27, wherein said at least one surface is provided with an annular array of between about 10 and 400 recesses.

33. The torque converter of claim 32, wherein said array includes between about 100 and 300 recesses.

34. The torque converter of claim 27, wherein at least some of said recesses are elongated and have lengths of between about 10 and 50 mm.

35. The torque converter of claim 34, wherein said lengths are between about 10 and 30 mm.

36. The torque converter of claim 27, wherein at least some of said recesses have depths less than about 0.3 mm.

37. The torque converter of claim 36, wherein said depths are below 0.15 mm.

38. The torque converter of claim 27, wherein at least some of said recesses have widths of between about 0.2 and 20 mm.

39. The torque converter of claim 38, wherein said widths are between about 0.5 and 1 mm.

40. The torque converter of claim 27, wherein the ratio of the area taken up by said recesses to the area of the non-recessed portion of said at least one surface is between about 2:1 and 1:200.

41. The torque converter of claim 40, wherein said ratio is between about 1:1 and 1:10.

42. The torque converter of claim 27, wherein said at least one surface has edges bounding said recesses, at least some of said edges being at least substantially rounded.

43. The torque converter of claim 5, wherein said clutch further comprises a lamella disposed between said components and rotatable with said output element, said lamella having first and second surfaces respectively confronting said driving and driven components and said regulating means including recesses provided in at least one of said surfaces and establishing paths for the flow of fluid between said chambers in the engaged condition of said clutch.

44. The torque converter of claim 43, wherein each of said components includes a friction lining engaging the respective surface of said lamella at least in the at least partly engaged condition of said clutch.

45. The torque converter of claim 43, wherein the recesses in said at least one surface of said lamella include first recesses open inwardly toward said axis and second recesses open outwardly away from said axis.

46. The torque converter of claim 43, wherein at least some of said recesses extend at least substantially radially of said axis.

47. The torque converter of claim 5, further comprising a damper arranged to damp torsional vibrations between said housing and said output element in the engaged condition of said clutch, said damper including an input having a lamella disposed between and frictionally engaging said components in the engaged condition of said clutch, an output arranged to rotate with said output element, and at least one energy storing element interposed between said input and said output.

48. The torque converter of claim 5, wherein said clutch further comprises at least one porous layer disposed between said components and establishing a plurality of paths for the flow of fluid between said chambers in the engaged condition of said clutch.

49. The torque converter of claim 48, wherein said porous layer includes an annular disc containing a sintered material.

50. The torque converter of claim 49, wherein said sintered material is selected from the group of materials consisting of metal, plastic, glass, ceramics and mixtures and compounds thereof.

51. The torque converter of claim 48, wherein said clutch further comprises a friction lining between said components, said porous layer being force-lockingly connected with one of said driving component, said driven component and said friction lining.

52. The torque converter of claim 5, wherein said clutch further comprises a friction lamella disposed between said components and movable axially of said housing between an abutment provided in said housing and a piston movable axially of said housing and forming part of said driven component.

53. The torque converter of claim 52, wherein said housing includes a portion surrounding said clutch and said abutment is non-rotatably mounted in and movable axially of sad housig.

54. The torque converter of claim 5, wherein one of said components consists at least in part of a porous material arranged to establish a plurality of paths for the flow of fluid between said chambers in the engaged condition of said clutch.

55. The torque converter of claim 54, wherein the other of said components includes a friction lining abutting said one component in the engaged condition of said clutch.

56. The torque converter of claim 5, wherein said clutch further comprises a porous member riveted to one of said components and providing a plurality of paths for the flow of fluid between said chambers in the engaged condition of said clutch.

57. The torque converter of claim 5, wherein said regulating means comprises at least one array of recesses provided in at least one of said components and communicating with one of said chambers, and ports provided in said at least one component and communicating with said recesses and with the other of said chambers.

58. The torque converter of claim 57, wherein said at least one component includes at least one friction lining confronting the other of said components and provided with said recesses, and a piston carrying said friction lining and provided with said ports.

59. The torque converter of claim 57, wherein said recesses have open ends communicating with said one chamber and said ports are located radially outwardly of said open ends.

60. The torque converter of claim 57, wherein said at least one component is said driving component and includes a friction lining provided with said recesses, said driven component comprising a piston and said ports being provided in said piston to repeatedly communicate with said recesses during operation of the clutch with slip.

61. The torque converter of claim 57, wherein said ports repeatedly communicate with said recesses only when the clutch is operated with slip between said components.

62. The torque converter of claim 57, wherein the number of said ports is different from the number of said recesses.

63. The torque converter of claim 57, wherein said regulating means further comprises open-and-shut valves for said ports.

64. The torque converter of claim 63, wherein each of said valves includes a tongue movably carried by said at least one component.

65. The torque converter of claim 64, wherein said tongues are resilient and tend to assume positions in which they permit fluid to flow between the respective recesses and said other chamber.

66. The torque converter of claim 65, wherein said tongues are arranged to seal the respective recesses from said other chamber in response to changes of fluid pressure in said other chamber relative to the fluid pressure in said one chamber.

67. The torque converter of claim 63, wherein said valves are arranged to open in response to rotation of said components relative to each other.

68. The torque ccnverter of claim 57, wherein said recesses have open ends communicating with said one chamber and said regulating means further comprises an annular second array of recesses provided in said at least one component, alternating with the recesses of said at least one array, having open ends communicating with said other chamber, and repeatedly communicating with said ports while said clutch operates with slip.

69. The torque converter of claim 5, wherein said regulating means includes at least one annular array of recesses provided in one of said components and communicating with one of said chambers, an annular array of ports provided in the other of said components and repeatedly communicating with successive recesses of said at least one annular array during operation of the clutch with slip, and bellows borne by said other component and each communicating with one of said ports, said bellows being contacted by fluid in said other chamber and being deformable in response to the establishment of a differential between the pressures of fluid in said chambers.

70. The torque converter of claim 69, wherein said bellows are resilient and are arranged to receive fluid from said other chamber when the pressures of fluid in said chambers differ to a predetermined extent.

71. The torque converter of claim 69, wherein only said other component comprises a friction lining.

72. The torque converter of claim 69, wherein said bellows are elastic.

73. The torque converter of claim 72, wherein said bellows consist, at least in part, of a material selected from the group consisting of thin sheet metal and rubber.

74. The torque converter of claim 69, wherein said bellows have limited capacities for reception of fluid.

75. The torque converter of claim 69, wherein said bellows are arranged in a circle.

76. The torque converter of claim 75, wherein said circle comprises between about 3 and 36 bellows.

77. The torque converter of claim 75, wherein said circle comprises between about 9 and 24 bellows.

78. The torque converter of claim 69, wherein said other component comprises a piston and said bellows include prefabricated sheet metal blanks at least substantially sealingly affixed to said piston.

79. The torque converter of claim 69, wherein all of said bellows form part of a single piece of sheet-like material affixed to said other component.

80. The torque converter of claim 69, wherein said bellows are arranged to offer resistance to the inflow of fluid.

81. The torque converter of claim 80, wherein said bellows are inflatable against the resistance of fluid in said other chamber.

82. The torque converter of claim 81, wherein at least one of said bellows includes a sheet metal member affixed to said other component and arranged to move by snap action between first and second positions in which the fluid receiving capacity of the at least one bellows respectively assumes a relatively large and a relatively small value.

83. The torque converter of claim 82, further comprising at least one stop arranged to limit the extent of movement of said member by snap action to at least one of said first and second positions.

84. The torque converter of claim 83, wherein said at least one stop is arranged to prevent a movement of said member beyond said second position.

85. The torque converter of claim 84, wherein said other component includes a piston and said piston includes said at least one stop.

86. The torque converter of claim 69, wherein each of said ports is arranged to admit fluid into and to provide a path for expulsion of fluid from a discrete bellows, said ports being arranged to establish communication between the interiors of the respective bellows and said other chamber, said one component including a friction lining and said recesses being provided in said friction lining.

87. The torque converter of claim 69, wherein said recesses have enlarged portions communicating with successive ports of said annular array of ports when said clutch is operated with slip.

88. The torque converter of claim 5, wherein said regulating means comprises an annular undulate surface provided on one of said components and a sealing member having a second surface adjacent said undulate surface and provided on the other of said components, said surfaces establishing a plurality of paths for the flow of fluid only when the clutch is operated with slip.

89. The torque converter of claim 88, wherein said undulate surface is provided on a deformable ring-shaped member of a piston of said one component.

90. The torque converter of claim 89, wherein said piston has a radially outermost portion remote from said axis and said ring-shaped member is provided on said radially outermost portion of said piston.

91. The torque converter of claim 90, wherein said second surface is provided on said housing.

92. The torque converter of claim 5, wherein said regulating means includes means for pumping fluid between said chambers.

93. The torque converter of claim 5, wherein said driven component comprises a first piston and said regulating means comprises an auxiliary piston defining with said first piston a third chamber communicating with said plenum chambers by way of passages provided in at least one of said components.

94. The torque converter of claim 5, wherein said regulating means comprises a cooling unit provided at a side of one of said components facing away from the other of said components, said cooling unit having a third chamber for a supply of coolant.

95. The torque converter of claim 94, wherein said components frictionally engage each other at a first radial distance from said axis in at least partly engaged condition of said clutch, said third chamber including a first portion at said first radial distance from said axis and a second portion at a lesser second radial distance from said axis.

96. The torque converter of claim 94, wherein said third chamber is outwardly adjacent said housing.

97. The torque converter of claim 94, wherein said driven component includes a piston and said third chamber is adjacent a side of said piston facing away from said driving component.

98. The torque converter of claim 94, wherein said cooling unit comprises a substantially cup-shaped enclosure for said third chamber, said enclosure being sealingly affixed to said one component.

99. The torque converter of claim 98, wherein said enclosure is secured to said one component by at least one of the undertakings including welding, caulking and snap action.

100. The torque converter of claim 94, wherein said coolant is selected from the group consisting of water and a liquefied gaseous fluid.

101. The torque converter of claim 94, wherein the coolant is arranged to exchange heat with at least one of said components in accordance with evaporation enthalpy.

102. The torque converter of claim 94, wherein said coolant is liquid at lower temperatures and changes its aggregate state by convection to a gaseous state in response to heating as a result of contact with at least one of said components.

103. The torque converter of claim 102, wherein said change of agregate state is effected under the action of centrifugal force when said components rotate and the clutch operates with slip.

104. The torque converter of claim 94, wherein said components frictionally engage each other at a first radial distance from said axis in at least partly engaged condition of said clutch, said third chamber including a first portion at said first radial distance from said axis and a second portion at a lesser second radial distance from said axis, said coolant being a liquid in said first portion of said third chamber and assuming a gaseous aggregate state in said second portion of said third chamber with a tendency to become a liquid and to flow back into said first portion of said third chamber under the action of centrifugal force in response to cooling in said second portion of said third chamber.

105. The torque converter of claim 5, wherein said regulating means comprises at least one blade provided on said turbine adjacent said driven component and arranged to agitate the fluid in said housing.

106. The torque converter of claim 105, wherein said at least one blade is of one piece with said turbine.

107. The torque converter of claim 106, wherein said turbine comprises at least one vane confronting said pump and of one piece with said at least one blade.

108. The torque converter of claim 105, wherein said at least one blade is affixed to said turbine.

109. The torque converter of claim 105, wherein said components comprise friction linings engaging each other when the clutch is operated with slip, said at least one blade being adjacent said friction linings.

110. The torque converter of claim 105, wherein said regulating means includes an annular array of blades on said turbine.

111. The torque converter of claim 110, wherein said regulating means further comprises an annular carrier for said blades, said carrier being affixed to said turbine.

112. The torque converter of claim 5, wherein said regulating means comprises at least one pumping device arranged to convey fluid from one of said chambers into the other of said chambers when said clutch is operated with slip.

113. The torque converter of claim 112, wherein said at last one pumping device comprises a body having first and second openings respectively communicating with a source of fluid and with one of said chambers, and a pumping element reciprocable in said body to effect the transfer of fluid from said source to said one chamber.

114. The torque converter of claim 113, wherein said turbine has a hub surrounding said output element and said at least one pumping device is installed in said hub.

115. The torque converter of claim 113, wherein said pumping element is arranged to seal one of said openings when the clutch is operated without slip.

116. The torque converter of claim 105, wherein at least one of said components includes a friction lining remote from said axis and said at least one pumping device is adjacent said at least one friction lining.

117. The torque converter of claim 116, wherein said at least one pumping device is arranged to communicate with one of said chambers by way of recesses provided in one of said components.

118. The torque converter of claim 117, wherein said recesses have open ends communicating with said one chamber and said regulating means has additional recesses sealed from said one chamber.

119. The torque converter of claim 117, wherein said recesses are provided in said friction lining.

120. The torque converter of claim 116, wherein said regulating means comprises an annular array of pumping devices.

121. A method of cooling an engageable and disengageable bypass clutch which is installed in the rotary housing of a hydrokinetic torque converter and has coaxial rotary driving and driven components which frictionally engage each other when the clutch is at least partly engaged, such partial engagement involving a slip of said components relative to each other, comprising the steps of:

providing in the housing first and second plenum chambers and maintaining therein bodies of hydraulic fluid arranged to at least partly engage the clutch in response to the establishment of a pressure differential between said bodies;

establishing at least one path for the flow of fluid between said chambers by way of the clutch, at least in the partly engaged condition of the clutch; and

regulating the flow of fluid along the at least one path in dependency upon the extent of slip between said driving and driven components.

122. The method of claim 121, wherein said regulating step includes increasing the rate of fluid flow along the at least one path when the clutch operates with slip and reducing said rate of fluid flow when the clutch operates without slip.

123. The method of claim 121, wherein said regulating step includes interrupting the flow of fluid along said at least one path when the clutch is operated without slip.

124. The method of claim 121, wherein said regulating step includes installing an adjustable valve in said at least one path.

125. The method of claim 121, wherein said step of establishing said a least one path includes providing the driving and driven components of the clutch with pluralities of first and second passages for the flow of fluid to and from the first and second chambers, said regulating step including establishing communication between the first and second passages at a frequency

which increases in response to increasing slip of the driving and driven components relative to each other.

126. The method of claim 121, wherein said regulating step includes pumping the fluid along the at least one path at a rate which increases in response to increasing slip of the driving and driven components relative to each other.

127. The method of claim 121, wherein said regulating step includes continuously contacting at least one of the driving and driven components of the clutch with a confined supply of coolant which changes its aggregate state in response to changes of temperature of the at least one component.